



PATENT

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Christine Brauer  
Application No. : 09/960,269  
Filed : September 20, 2001  
For : USE OF PRE-SORTED PLASTIC MATERIAL WASTES AND  
PROCESS FOR PRODUCING A GRANULAR MATERIAL AS A  
FILTER FOR THE PURIFICATION OF SEWAGE (As Amended)

Art Unit : Not Assigned Yet  
Docket No. : 170135.401  
Date : December 26, 2001

Box Missing Parts  
Commissioner for Patents  
Washington, DC 20231

PRELIMINARY AMENDMENT

Commissioner for Patents:

Please amend the above-identified application as follows:

In the Title:

Please delete the existing Title and replace with the following new Title:

USE OF PRE-SORTED PLASTIC MATERIAL WASTES AND PROCESS FOR  
PRODUCING A GRANULAR MATERIAL AS A FILTER FOR THE PURIFICATION OF  
SEWAGE.

In the Abstract:

Please add the following Abstract:

A granular material for use as a filter in the purification of sewage. The granular material is comprised of pre-sorted and cleaned plastic material wastes. A process for producing the same is provided.

### In the Specification:

Please replace the paragraphs beginning at page 1, line 5, with the following rewritten paragraphs:

### TECHNICAL FIELD

The invention concerns the ecologically meaningful use of pre-sorted plastic material wastes and a process for producing a granular material as a filter for the purification of sewage and waste water.

### BACKGROUND

The use of plastic material wastes, in particular those which have been pre-sorted and/or purified, is known in the state of the art, as well as various processes for producing a granular material made up of a single kind of material, as a filter for the purification of sewage and waste water. As is known, large amounts of plastic material wastes, in particular also domestic packaging, are recycled in terms of the material involved. The Deutsche Gesellschaft für Kunststoffrecycling GmbH, referred to for the sake of brevity as DKR, implemented a procedure for suitably splitting up those various plastic materials. There is a foil or sheet fraction, a plastic bottle fraction, an E PS fraction, a cup fraction and a mixed plastic material fraction. Residues are put to use by thermal processes, for example by the production of energy by incineration. Thus DSD (Duales System Deutschland) already represented in 1997 a utilisation quota of 86%, as is referred to in the newspaper 'DIE WELT' of 5th February 1999. However the DSD-DKR system also presents itself as being more and more market and economy oriented. If at the present time there are still loss-making quotas of DM 500.00/mt for the processors which are certified in the DSD-sector, that will in fact change in the next few years.

Naturally large corporate groups with enormous levels of expenditure are in a position to satisfy the qualitative wishes of some limited customers including, inter alia, those abroad. Nonetheless the market for the DSD material still remains limited. The reasons are problems dealing with materials of a single kind in each case, certain odorous fragments and the difficulty of the technical specification which still remains the same.

There is therefore a need at the lowest possible level of expenditure to produce a simple and ecologically meaningful product, starting from a basic raw material which is continuously available and which, unlike the situation with tubes or flanges which can be produced from the DSD granular material, sets only low levels of demand in terms of quality.

### DETAILED DESCRIPTION

Please replace the paragraphs beginning at page 2, line 25, with the following rewritten paragraphs:

Surprisingly, it has been found that in actual fact, pre-sorted plastic material waste, as occurs with DSD in the form of a waste product, can be used not only as a recycling product, but also a granular material produced therefrom can be used as a filter for the purification of sewage. That is a particularly ecological form of exploitation which affords an extremely inexpensive starting material. Hitherto the men skilled in the art have not thought of such a system which operates in a circulatory mode, on the basis of regularly available DSD granular materials, as apparently the principle according to the invention of 'purifying waste (sewage) with waste' involves a major inhibition.

While in accordance with the invention a cascade extruder operates without peroxide, it is advantageous in terms of the process for a small amount of peroxide to be added for cross-linking purposes to the DSD base product in the screw extruder, giving a homogeneous end product. Advantageously, for that purpose, only between about 10 and 20 and in particular 15% by weight of the DSD plastic waste material is mixed with the peroxide additive, for example dicumyl peroxide at 40% in PE, or peroxide-bearing waste materials, in particular chopped or ground floor heating tubes, in order to achieve the largest possible surface area for the granular material, whereby the colonisation of micro-organisms is possible and the longevity of the granular material is increased.

The degressive temperature control in conjunction with the peroxide provides for a resistant surface area for the granular material, which is as large as possible and which permits micro-organism colonisation. The peroxide also affords the advantage that in this case, with the longevity in question, involves a system which after purification can in practice be used repeatedly.

Please replace the paragraph beginning at page 4, line 12, with the following rewritten paragraph:

- extrusion through a 1.5 mm apertured plate. A man skilled in the art can envisage other sizes;

In the Claims:

Claims 1-28 have been canceled. New claims 29-59 have been added.

29. (New) A method of producing a material for use as a filter to purify sewage, the method comprising:

- a) providing pre-sorted plastic material wastes comprising substantially polyethylene or polypropylene; and
- b) forming the plastic material wastes into granular material.

30. (New) The method as set forth in claim 29 wherein the granular material is of a grain size which is in the range of between about 0.5 and 5 mm.

31. (New) The method as set forth in claim 30 wherein the grain size is between about 3 and 4 mm.

32. (New) The method as set forth in claim 29 wherein the granular material is of a substantially cylindrical shape, with a cylinder diameter of between about 1 and 5 mm and a cylinder length of between about 1 and 5 mm.

33. (New) The method as set forth in claim 29 wherein the granular material has a structured surface.

34. (New) The method as set forth in claim 29 wherein the granular material is in the form of a sleeve.

35. (New) The method as set forth in claim 29 wherein the granular material is of a very high specific surface area which is in the region of more than  $1 \text{ cm}^2$ , preferably more than  $2 \text{ cm}^2$  per granular material particle.

36. (New) The method as set forth in claim 29 wherein the pre-sorted plastic material wastes are substantially produced from old plastic material bottles substantially comprising polyethylene and polypropylene.

37. (New) The method as set forth in claim 29 wherein the plastic material wastes represent a mixture of at least two polymer materials forming a homogenous mixture.

38. (New) The method as set forth in claim 29 wherein the granular material particles are of a density of between about  $0.700$  and  $0.980 \text{ g/cm}^3$ , preferably between  $0.890$  and  $0.940 \text{ g/cm}^3$ .

39. (New) The method as set forth in claim 29 wherein the tensile strength of the granular material particles is approximately in the range of between  $15$  and  $708 \text{ MPa}$  and the granular material particles expand under a tensile loading by between about  $5$  and  $20\%$  of their initial size.

40. (New) The method as set forth in claim 29 wherein the granular material has a modulus of elasticity of between about  $650$  and  $1500 \text{ MPa}$ , preferably between about  $900$  and  $980 \text{ MPa}$ .

41. (New) The method as set forth in claim 29 wherein the granular material has a lens-shaped particle form.

42. (New) The method as set forth in claim 29 wherein the granular material has cavities whose total volume is less than  $10\%$  of the total volume of the granular material particles.

43. (New) The method as set forth in claim 29 wherein the polypropylene portion in the granular material is at least 5% and preferably between about 10 and 20%.

44. (New) The method as set forth in claim 29 further comprising an addition of between about 0.01 and 5% by weight of a peroxide, with respect to the total weight of the plastic material, is added to the pre-sorted plastic material wastes.

45. (New) The method as set forth in claim 29 further comprising an addition of between about 0.1 and 0.5% by weight of a peroxide, with respect to the total weight of the plastic material.

46. (New) The method as set forth in claim 29 wherein the plastic material wastes from which the granular material is produced are cleaned.

47. (New) The method as set forth in claim 29 further comprising adding a peroxide to the plastic material wastes in ground form.

48. (New) The method as set forth in claim 29 wherein the plastic material wastes from which the granular material is produced contain a plurality of mixed plastic materials.

49. (New) A process of producing a granular material which is suitable as a filter for the purification of sewage, comprising the following steps:

- a) procuring and preparing pre-sorted plastic material wastes, in particular those from the Duales System Deutschland DER GRÜNE PUNKT,
- b) cleaning, chopping and drying said plastic material waste,
- c) heating the plastic material waste to the molten state,
- d) extruding the molten material through a screw or cascade extruder, and
- e) cooling the molten material and cutting the resulting granular material at the desired length.

50. (New) The process as set forth in claim 49 wherein prior to step e) there is an addition of between 0.1 and 0.5% by weight of peroxide or peroxide-bearing wastes at the extruder head.

51. (New) The process as set forth in claim 50 wherein only between 10 and 20% by weight of the plastic material waste is mixed with between 1 and 3% by weight of peroxide and then homogenised with between 80 and 90% by weight of the initial material of plastic material waste.

52. (New) The process as set forth in claim 51 wherein 15% by weight of the plastic waste material is mixed with between 1 and 3% by weight of peroxide and 85% by weight of the starting material of plastic waste material is mixed and homogenised.

53. (New) The process of claim 49 wherein a temperature in the extruder is degressively adjusted.

54. (New) The process as set forth in claim 49 further comprising degressively adjusting the temperature in the extruder so that an inlet thereof is in the range of between about 250 and 300°C and the extruder head is between about 180 and 200°C.

55. (New) The process as set forth in claim 49 wherein a cascade extruder with a 400 mm sieve and a 2.5 mm aperture plate are used.

56. (New) A granular material which is used as a filter for the purification of sewage comprising pre-sorted plastic material wastes.

57. (New) The granular material of claim 56 wherein the pre-sorted plastic material wastes comprise a plurality of mixed plastic materials

58. (New) The granular material of claim 56 wherein the density of the granular material is between about 0.70 g/cm<sup>3</sup> and about 0.980 g/cm<sup>3</sup>.

59. (New) The granular material of claim 56 wherein the density of the granular material is between about 0.890 g/cm<sup>3</sup> and about 0.940 g/cm<sup>3</sup>.

REMARKS

Claims 1-28 have been canceled. New claims 29-59 have been added.

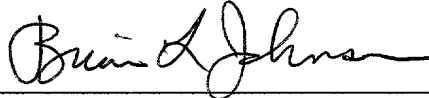
Attached hereto is a marked-up version of the changes made to the specification by the current amendment. The attached page is captioned "**Version With Markings to Show Changes Made.**"

Applicant respectfully submits that all of the claims remaining in the application are now clearly allowable. Favorable consideration and a Notice of Allowance are earnestly solicited.

Respectfully submitted,

Christine Brauer

Seed Intellectual Property Law Group PLLC



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## VERSION WITH MARKINGS TO SHOW CHANGES MADE

### In the Title:

~~Verwendung von vorsortierten Kunststoffabfällen und Verfahren zum Herstellen eines Granulats als Filter für die Reinigung von Abwasser~~ USE OF PRE-SORTED PLASTIC MATERIAL WASTES AND PROCESS FOR PRODUCING A GRANULAR MATERIAL AS A FILTER FOR THE PURIFICATION OF SEWAGE.

### In the Abstract:

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procedure for suitably splitting up those various plastic materials. There is a foil or sheet fraction, a plastic bottle fraction, an E PS fraction, a cup fraction and a mixed plastic material fraction. Residues are put to use by thermal processes, for example by the production of energy by incineration. Thus DSD (Duales System Deutschland) already represented in 1997 a utilisation quota of 86%, as is referred to in the newspaper 'DIE WELT' of 5th February 1999. However the DSD-DKR system also presents itself as being more and more market and economy oriented. If at the present time there are still loss-making quotas of DM 500.00/mt for the processors which are certified in the DSD-sector, that will in fact change in the next few years.

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